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Returnable PET Bottle



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Special Report:
Films & Resins

PACKAGING



**Here's an idea
that 'can't miss'**

One feature article in this issue describes "8 Hot Trends in Food Packaging." As might be expected, one of the trends is microwavable packaging. Clever use of susceptors built into packages is spurring new growth for microwave packaging. But susceptors are only the tip of the iceberg. Many different techniques and ideas are coming forth—everything from milkshakes to corn-on-the-cob is now being sold in specially-designed packages for microwave ovens.

Another trend is controlled atmosphere packaging (CAP). Some interesting developments have quietly taken place with CAP. Many of the applications have been in institutional markets, therefore, CAP has not been highly visible. Nor will it ever be highly visible, simply because of the nature of CAP. But as attention turns to the retail level, much more publicity will be generated than now.

Another trend in packaging involves high-barrier plastic containers, particularly retortable plastic containers. Three companies recently making news with retortable plastics for food are Hormel, Del Monte, and The Dial Corp. Stay tuned for many more developments in this area.

Meanwhile, the trend continues to tamper-evident food packaging. In PACKAGING's 1987 Consumer Survey, 31 per cent of the respondents said they avoided purchasing products during the past six months because tampering appeared to have occurred with the packages.

Other packaging trends described in the article are aseptic packaging, single-serve packaging, and life-style packaging.

In reviewing the trends, an interesting thought arises. What would happen if all the trends were combined into one package? Would that produce an item that can't miss? . . . Or would it produce disaster?

Actually, combining many of the trends into one concept is not so far-fetched. In fact, as many as six and seven of the trends are being combined into many of today's most successful new products and packages. Keeping these trends in mind is an integral part of developing a package that "can't miss."

James R. Davis
EDITOR

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Food Packaging Trends

Eight of the hottest trends are described.

Page 40

Returnable PET Bottle

Coca-Cola has an interesting test underway in Germany.

Page 10



Labeling Report

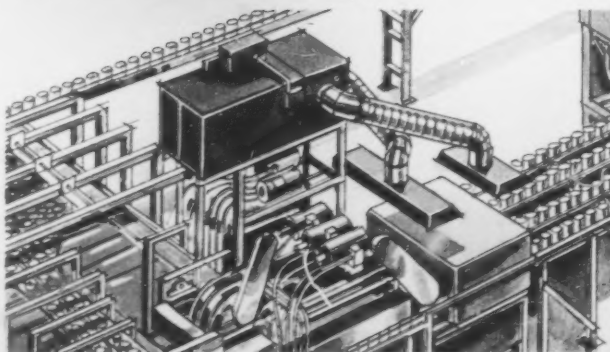
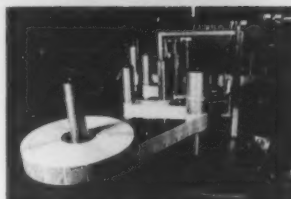
The "state of the art" for labeling is reviewed.

Page 60

New Canmaking System

Two-piece cans are made for 15 per cent less.

Page 118



CONTENTS

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PACKAGING NEWS

Coke aims for 20 trips with PET bottle 10

Tests of the returnable bottle look successful; molding may soon shift from U.S. to West Germany

Polycarbonate clarity chosen for retail bottled water 14

Fresh lunch meat line finds test-market success 15

Candy packages sweep Golden Mummy awards 16

PACKAGING FEATURES

SPECIAL REPORT

8 Hot Trends in Food Packaging 40

Here's a review of the latest innovations sweeping food packaging for today and tomorrow

PACKAGING OPERATIONS

Plant of the Month: New lines handles tough jobs 50

Close inspection, novel infeed system protect and hold loose decks of cards for cartoning and wrapping

STATE OF THE ART

Labelers are faster, more reliable 60

On-line label applicators are faster and more accurate than ever before

SPECIAL INSERT

Plastic Films and Resins 69

How the highly versatile family of packaging films looks today . . . and the shape of flexible things to come

Polyethylene: Not one film but many 70

Polypropylene: A commodity no more 76

PVC: Esthetics and security 80

Polyester: Microwaves and metal 83

Nylon: One tough barrier 87

Cellophane: Alone in a plastic crowd 89

Co-Extrusions: More reliable, more complex 90

Laminations: Doing what co-ex can't 94

Metallizing: Performance and pizzazz 98

Barrier Films: Satisfying increased demands 103

A Bright Future 105

Quick Reference Chart 110

PACKAGING TECHNOLOGY

Canmaking system saves 15% 118

Two-piece cans are made with less equipment and less labor with production speeds at 900-1,500 per minute

New EVOH triples barrier 123

A family of new EVOH resins uses a blend technology to achieve 300% better gas barrier

DEPARTMENTS

EDITORIAL PEOPLE	5	NEW EQUIPMENT	136	PACK MART	141
ASSOCIATION NEWS	18	NEW MATERIALS	137	CLASSIFIED ADS	142
	32	ADVERTISERS INDEX	141	WRAP UP	148

PACKAGERS IN THIS ISSUE

Armour Processed Meats	15	Hoody Corp.	16	Phillips 66	15
Coca-Cola	10	Kraft, Inc.	14	The Pillsbury Co.	15
Fantasia Industries	14	Interbake Foods Ltd.	16	Stanley Tool Co.	28
Galaxy Cheese Co.	16	Merck & Co.	28	Tea from Trumps	16
Gerber Products Co.	14	Miller Brewing Co.	14	U.S. Playing Card Co.	50
The Gillette Co.	29	Orbit Chemical Co.	29	Whitman's Chocolates	16

PLASTIC FILMS & RESINS

Accelerating developments in resins and blends of resins. Rapid improvements in laminations and co-extrusions. Sweeping advances in barriers—transparent and opaque. Frequent changes in consumers' wants and packagers' marketing strategies.

It's no wonder that flexible films are replacing rigid containers throughout the world of packaging.

With increasing demand comes steadily diminishing supply and rising prices throughout the industry. Luckily for suppliers of films and film resins, low-cost packaging is not their customers' only goal.



As one representative of a leading film manufacturer put it, "In light of continuing price jumps, it's no longer true that film is a cheap alternative to metal and glass. But now, it must be considered a creative alternative."

Here, then, is **PACKAGING** magazine's comprehensive report on the highly versatile family of packaging films as it looks today . . . and the shape of flexible things to come. ■

CONTENTS

Polyethylene	70
Polypropylene	76
PVC	80
Polyester	83
Nylon	87

Cellophane	89
Co-extrusions	90
Laminations	94
Metallizing	98

Barrier Films	103
A Bright Future	105
Quick Reference	
Charts: Film and Resin	
Manufacturers	110

POLYETHYLENE

NOT ONE FILM BUT

Exotic resins
and complex
co-extrusions
meet a wide
range of
packaging
needs

In packaging markets for polyethylene film, every use requires something different. PE resin is becoming a variety of custom resins, since customers are becoming increasingly demanding. Exotic resin formulas and complex co-extrusions are continually being developed to satisfy specific packaging needs.

For instance: Although PE has long enjoyed a reputation as a moisture barrier, one resin and film manufacturer has succeeded in developing an HDPE film that has twice the water vapor transmission rate properties as commodity-grade HDPE—from a commodity high of 0.35 to a new low of 0.18 for 1-mil films. Additional polyethylene research and development is being directed toward improving oxygen barrier properties.

Deceptive packages

A couple of examples of recently introduced packages help to illustrate the growing complexity of PE-based applications.

One is the diaper bag that has replaced the folding paperboard carton. The end user realized considerable savings in going from paper to plastic, but the plastic itself did not come easy.

The goal was something that sparkled, something that would catch the consumer's eye. Increased amounts of

What appears to be ordinary PE is actually highly engineered.



MANY

EVA resins were added to contribute that sparkle. The EVA raised the film's impact strength.

Even to some packaging professionals, the film used as a feminine napkin overwrap can appear commonplace. In reality, it is a highly engineered polyethylene product: A three-layer co-extruded film made of varieties of LLDPE with blends and laminations. The reason for all the blending and layering is that the overwrap was to be a very soft, "feminine" film.

A small but exciting potential growth area for PE-based co-extruded films is lidding/overwrap for the controlled-atmosphere packaging of fresh meats, poultry, fish, pasta, and eggs. One film co-extruder is now combining an EVOH barrier, an EVA seal layer, and a proprietary anti-fog additive with LDPE for this purpose.

Polyethylene is also making packaging headlines as a major component of reclosable zipper-top liners for cereal boxes. The companies involved in its R&D foresee ap-

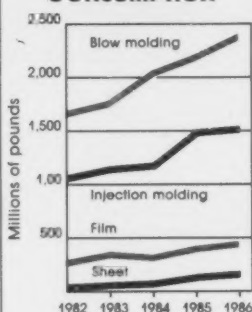
plications far beyond cereal.

But film used for bags and carton liners is not ordinary PE, either—or will not be for long. Competition for this burgeoning market is heating up, and materials suppliers are jockeying for position. One manufacturer of PE resins said that some packagers have expressed concern that odors and/or tastes might migrate from PE film into products packaged in film-lined cartons. That company has been touting its ability to produce resins that ameliorate those problems.

Alphabet soup

New to the polyethylene alphabet soup—which until recently comprised PE, HDPE, LDPE, and LLDPE—is ULDFE, or ultra low-density polyethylene. Among the

HDPE DOMESTIC CONSUMPTION



Source: Society of the Plastics Industry

1987 HDPE CAPACITY MILLION LBS. RESIN

Phillips	1,380
USI*	1,240
Solfex*	1,050
Allied	1,020
Cain	890
Chevron	575
Amoco	350
Union Carbide*	350
Dow	330
Hoechst	250
Himont	30

*HDPE capacity can be used to manufacture LLDPE.
Source: Industry estimates



POLYETHYLENE

ULDPE—ultra—
is the newest
addition to
polyethylene's
alphabet soup

properties that make ULDPE unique are increased resistance to punctures and tears, low-temperature sealing and therefore faster sealing rates, increased hot-tack strength, high flexibility, increased clarity, and minimal taste and odor migration.

ULDPE appears likely to earn a place as a significant polymer for co-extrusions. It is not lower in cost per inch or per pound of resin, but users may realize savings in fabricating the overall package as a result of film downgauging.

Potential uses for ULDPE: Co-extrusions of PP and HDPE with ULDPE instead of EVA to improve heat sealing of such materials as cereal box liners; laminations with

HDPE and barrier layers for bag-in-box applications; and low-temperature applications such as bags for yogurts, ice cream, and frozen beverages.

Trends in shrink film

Among the fastest-growing areas for LLDPE is shrink film. This market is being driven by two trends.

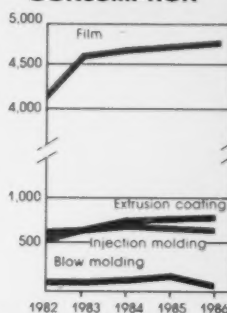
The first is that of tamper evidence. Products packaged in everything from bottles to paper cartons can be overwrapped entirely in PE or have their closures sealed with a narrow band of this film. The second driving force is the trend toward multi-packing. A trip through any warehouse-type grocery store reveals a sea of plastic overwrapping. This appears to be a big growth area for PE as well as for PP, either alone or in blends with each other.

Also growing is the use of shrink film as a replacement for corrugated cases. A dozen jars of peanut butter, for example, which once were packaged in a corrugated case, are now being set in a shallow

corrugated tray or even on just a single sheet of corrugated and being shrink-wrapped—often at a big saving.

Beyond merely tying two or three previously packaged products together, PE shrink film is also being used as primary packaging for fresh red meats, poultry, and cheese. This film provides the excellent water barrier properties inherent in PE as well as excellent oxygen barrier characteristics through the addition of EVOH or PVDC. Moreover, one film extruder is marketing an aroma-barrier shrink film. ■

LDPE DOMESTIC CONSUMPTION



Source: Society of the Plastics Industry

1987 LDPE CAPACITY MILLION LBS. RESIN

USI	1,785
Dow	955
Chevron	905
DuPont	705
Eastman	615
Westlake	585
Exxon	580
El Paso	550
Union Carbide	550
Mobil	500

Source: Industry estimates

Truly simple is the
tried-and-true monolayer
polyethylene bread bag.

POLYPROPYLENE

A COMMODITY NO

Resin and film suppliers are turning the PP market into one of specialty items

Traditionally, polypropylene has been regarded as a commodity. It still is in some markets. For nonpackaging uses, one supplier's PP is virtually indistinguishable from another's, and therefore most of it is purchased chiefly on the basis of price.

However, in the world of packaging, as increasingly reliable high technology becomes available, the distinction between various manufacturers and the techniques they use to boost performance of their packaging-grade resins and films are becoming more evident and more important.

Clearly, one industry trend is toward greater diversity: Resin manufacturers are looking for ways to differentiate their products and make the PP market more of a specialty business than it has been.

In the introduction of improved PP resins, Japan appears to be leading the U.S. by perhaps as much as 10 years, according to one major player in the industry. However, American companies are accelerating their research and development.

Improving performance

Among the new properties being introduced by domestic suppliers of PP are films offering reduced sealing temperatures, haze, and taste and odor migration. Even in light of these advances, the nature of PP is not changing as quickly as are the methods of making it. Many companies are working on ways of producing PP less expensively than before.

New resins and blends of resins with additives that give films low sealing temperatures are an industry-wide goal, since end users are look-

ing for improved heat-sealing characteristics. Melting points are dropping. That is a benefit to converters who have equipment that can handle these low-temperature films.

An especially versatile PP is available in Europe. It has two sealing layers—one low temperature and one extremely low temperature. This makes the film adaptable to a wide range of machinery.

Snacks lead the way

Annual growth of 7 to 10 per cent for PP as a packaging film seems realistic. Within packaging, the biggest market is food. And within that, the largest share is in snacks and confections.

Cookie makers see OPP as a solution to the problem of wax buildup on machinery used for glassine. And traditional users of cellophane are moving away from that film into OPP. Snacks packages sometimes have two or three layers of biaxially oriented PP combined with EVOH and metalizing.

Growing dramatically as a replacement for paper is opaque white OPP. Although this expanded-core film does not provide the ultraviolet-



MORE

light barrier of metallized film, it is in some applications competing directly with metallized on the basis of price. White OPP can simulate the appearance of metallized film when it is printed with transparent ink.

Low haze, high gloss

New to the PP film marketplace is one heat-sealable OPP film that offers higher gloss and lower haze than conventional films. This promises to increase the trend toward overwrapping of packages in PP shrink film.

Cigarettes, ice cream, butter, and margarine are three products presently being overwrapped this way. Tests have shown that weight loss of dairy products is significantly reduced when they are overwrapped in film. Tamper-evident benefits are also part of this trend.

A fringe benefit of this kind of overwrapping is the glossy look, which presents the product as a high-end, prestige item. In addition, there is a growing trend toward the packaging of, for example, a toothbrush along with the tube of toothpaste, a bottle of shampoo and a bottle of conditioner, and a beverage in a

paperboard carton with attached drinking straw.

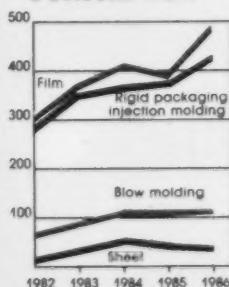
Produce and fruit could well prove to be the next foods to benefit from PP shrink-wrapping. Single fruit items such as individual oranges are handled repeatedly from the grove to the home. A growing consumer concern about disease transmission is prompting at least one film supplier to market its film as

an overwrap for oranges and other fruits one by one.

Another benefit of this kind of overwrapping is longer shelf life. If an orange is wrapped before bacteria begin to form, its shelf life can be extended to perhaps three months. The export market would benefit greatly. Furthermore, this overwrapping film could be pre-printed so that the shrink-film-wrapped orange would arrive at the grocery store complete with the grower's name in place. ■

Replacing paper in confections and snacks are two forms of PP: expanded-core and metallized.

PP DOMESTIC CONSUMPTION



Source: Society of the Plastics Industry

1986 PP CAPACITY MILLION LBS. RESIN

Himont	1,500
Amoco	1,000
Shell	800
Exxon	690
Aristech	515
Fina Oil	450
El Paso	350
Solfex	300
Phillips	250
Eastman	140

Source: Society of the Plastics Industry



PVC

ESTHETICS AND SECURITY

Overwrapping serves as barrier, boosts sense of safety, and adds touch of class

Leading the news in the polyvinyl chloride market are three major trends: tamper evidence, carton overwrap, and a new film manufacturing technique for in-store meat and produce film.

Shrink bands expand

One of the most recent and significant uses of biaxially oriented PVC is the tamper-evident shrink band of the type seen now on glass jars of mayonnaise and peanut butter as well as plastic cups of cottage cheese.

In 1985 the market for this type of band (combined with PVC shrink labels) was \$50-55 million. In 1986 it grew close to \$80 million. By the end of 1987, it could exceed \$100 million.

So far, one category of foods—juices and other beverages in wide-mouth bottles—has not taken up the shrink neck band. Chances appear good that it will: At least one major PVC supplier is presently expanding production capacity solely to accommodate this application.

As use of the shrink band increases, competition among suppliers of the banding film will increase, too. One beneficial effect is downgauging—from 3 mils to 1.5 mils and eventually to 1 mil—as a

means of reducing cost.

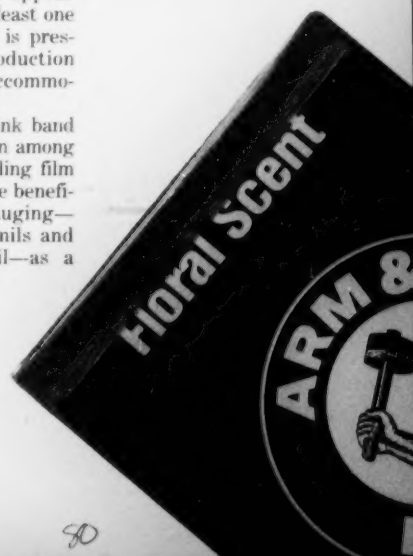
PVC is likely also to gain in popularity as a whole-carton overwrap. Some candidates for this overwrapping are breakfast cereal, pancake mix, and frozen-entree cartons. This PVC overwrap will help prevent tampering; additionally, it will give the packages the glossy look that speaks to the consumer of upscale contents.

A sleeping giant

In-store packaging of meats and produce consumes 100-110 million pounds of film annually—and it is almost exclusively PVC. The film could quickly command a large share of the pre-packaged fresh fish and poultry market, too.

Also, fresh produce requires most of the same film characteristics required by fresh meat. Approximately 25

In-store wrap, carton overwrap, and shrink bands make wide use of three different formulations of PVC.



million pounds of PVC is now sold into the produce market. The total could reach 200 million pounds, said one PVC manufacturer, if the "sleeping giant," produce, awakes.

Two factors account for the widespread belief that the giant is stirring. One is continued consumer demand for utmost convenience. Imagine how greatly check-out line efficiency would increase if produce items, packed in PVC-overwrapped trays complete with UPC code labels, no longer had to be weighed separately. Another factor is the health issue. Fresh produce in the store is the only food product that can be touched directly by everyone. An overwrapping of film would help reassure the consumer that much was being done to improve the cleanliness of these produce items.

Another convenience item representing a growth opportunity for PVC would be produce-based assortments such as carrot and celery sticks and califlower sprigs packaged together with a dip in a tray.

One manufacturer of PVC film for in-store wrapping applications has announced a new manufacturing procedure which combines technologies from Asia, Europe, and the United States. The new film is said to offer improved clarity, tensile strength, and elongation at no increase in price over traditional blown film.

Also being introduced is a new resin for meat-wrap PVC film. The performance benefits of film made from this resin include exceptional clarity and sparkle, as well as a widened processing window. Its melting point is 310° F.—70 degrees lower than other PVC films.

According to its manufacturer, this is a porous resin, which allows film makers to quickly rid it of residual vinyl chloride monomer during the compounding operation, helping ensure that the film will meet extremely low FDA limits for RCVM.

In Europe there is concern about plasticizers used in PVC and their potential migration into foods. That could steer packagers away from rigid PVC to other materials. However, this issue seems to be felt as no threat in flexible packaging.

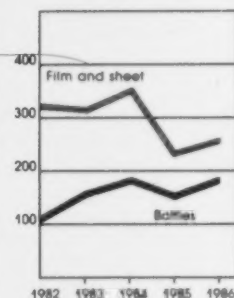
Said the spokesperson for one large producer of PVC film, "We don't see a problem with the FDA in markets in which PVC is already in use. For meat overwrap and intravenous solution bags, for example, the problem is negligible. In bottles, we have another issue altogether, but for flexible, it is almost a non-issue."

A bigger issue for PVC domestically, it seems, is what can be done to increase resin supply and bring stability to rising prices. Use of PVC in all packaging uses is increasing, despite a slight dip in 1985. Usage has grown from 424 million pounds in 1981 to 572 million pounds in 1985.

At present, no new capacity appears to be coming on stream.



U.S. CONSUMPTION PVC



Source: Society of the Plastics Industry

1987 PVC CAPACITY MILLION LBS. RESIN

BF Goodrich	1,650
Occidental	1,520
Shintech	950
Georgia Gulf	850
Borden	800
Vista	715
Air Products	500
Certain-Teed	220
Goodyear	110
Vygen	100

Source: Society of the Plastics Industry

POLYESTER

MICROWAVES AND METAL

Ovenable and easily metallized, PET film benefits from multiple packaging trends

What do microwavable popcorn and bag-in-box apple juice have in common? Aside from the fact that they go well together as a round-the-tv snack, they illustrate two big uses of polyester film.

It is estimated that by 1991 microwavable packaging for popcorn and pizza alone will reach nearly \$92 million. PET film probably will be riding that wave, since it is a component of microwave packaging for foods requiring metallized-film susceptors—such as pizza and popcorn—and of lidding for dual-ovenable foods.

Another use of metallized PET is in the snacks packaging field, as a competitor to metallized OPP. And in metallized form, PET is also providing the needed barriers in some bag-in-box applications. PET has long been considered one of the best of all plastic films for metallizing.

Just as expanded-core OPP is being used instead of metallized film to give a package a metallized-like appearance, metallized PET may soon see

some competition from expanded-core PET. This film combines the pearly look of the OPP with the barrier qualities of the PET. At the moment, expanded-core PET is not priced competitively enough to pose a threat to expanded-core OPP.

Metallized PET is growing in snack food and confection areas. Among the newest developments in this area is a heat-sealable PET for metallizing. It is now at the market-introduction stage.

Barrier properties

The increasing interest in organoleptics is also stimulating usage of PET in composite cans for orange juice. And the same scalping that can occur in orange juice cans having polyolefin food-contact layers can happen in pouches that utilize polyolefins as sealing layers. Powdered foods, dried fruits, and other foods in pouches—just as sensitive to scalping as orange juice—represent new markets for PET film.

In the growing market for lidding materials, one film producer has been highly successful with heat-sealable PET. Another major player has been working on a heat-sealable, peelable PET lid for dual-ovenable trays. Both offer advantages over PET materials that make use of

adhesives, since the adhesives may migrate.

PET is also benefiting from the move toward glossy reverse-printed paperboard cartons of the sort used in packaging dishwasher detergent cartons. Additional applications seem likely as the consumer begins to fully appreciate the particularly glossy look of PET film-overwrapped packages.

Labeling boom

Another significant PET film use to have blossomed during the past five years is shrink-film labeling. These labels afford especially attractive graphics. And, if they are used simultaneously as a shrink-band closure overwrap, they make the package tamper-evident, too.

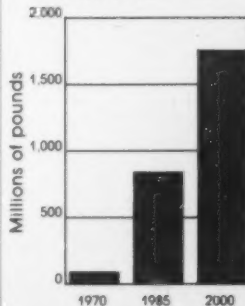
Clear in the oven or metallized in a box, PET film is growing in use.

1986 U.S. PET FILM SALES PACKAGING, MILLION LBS.

DuPont	24
ICI	10
Hoechst	8
Imports/Others	9

Source: Industry Estimates

U.S. DEMAND FOR PACKAGING PET



Source: Society of the Plastics Industry

BROS

HILLS BROS

NYLON

ONE TOUGH BARRIER

Nylon's role in packaging dry and fatty foods is likely to grow with the debut of two new films

Two recently introduced forms of nylon hold promise of enlarging this tough material's role in flexible packaging. Each of the new films is said to offer improvements in the already good clarity and barrier properties of earlier types.

Amorphous nylon

The manufacturer of amorphous nylon—who just won FDA approval for its use with dry foods, fatty foods, and dry foods containing oils—is still awaiting FDA approval for other foods uses. In the meantime, the company is actively pursuing the meat-packaging market.

As an oxygen barrier, amorphous nylon is said to be better than PET and HDPE films. Although it is not as good an oxygen barrier as EVOH, at approximately \$1.60 a pound it is less expensive and moisture-sensitive than EVOH.

Amorphous nylon is a non-scalping flavor and aroma barrier on its own. It can be used to boost these properties in multi-layer co-extrusions.

Biax nylon

The first and only U.S. plant for manufacturing biaxially oriented nylon opened last spring, bringing domestic capacity to nine million pounds a year. A few months ago, Japan was the sole source.

Biax nylon, a monolayer film, offers better machinability and printing as well as higher strength and transparency than non-biax nylons. Positioned in part as a competitor to PET and OPP films, biax nylon is being launched as a packaging film for cheeses, meats, frozen foods, coffee, and foodservice liquids.

Fresh opportunity

Fresh meat represents a new opportunity for nylon. Meat containing bones is seen as a prime candidate for nylon-film packaging, since nylon is particularly puncture-resistant. Experience with this product has led nylon film suppliers to compete with PET film in packaging confections such as granola bars, which also have sharp, abrasive edges. In

metallized form, nylon is going head-to-head with metallized PET in coffee "brick" packaging.

Another growing application for nylon—often with a PVDC coating—is in controlled-atmosphere packaging. This takes two forms: in the film laminated to paper-board trays and as lidding.

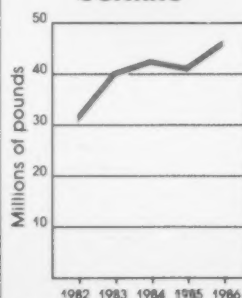
Benefiting from the continuing push for consumer convenience, nylon is moving more forcefully into boil-in-bag applications. An improvement in the sealants and tie layers used in nylon-based co-extruded films is helping. Characteristics that make nylon co-extrusions suitable

Coffee and processed meats are big users of nylon—in laminated and co-extruded form.

for boil-in-bags also have applications for pouches containing wine and foodservice condiments.

One major film co-extruder has launched a new multilayer nylon film for flexible pouch packages of pumpable foods. It is a co-extruded film incorporating polyolefins and EVOH plus nylon. ■

U.S. CONSUMPTION NYLON FILM, COATING



Source: Society of the Plastics Industry

1986 NYLON CAPACITY MILLION LBS. RESIN

DuPont	230
Allied	110
Monsanto	80
Hoechst	40
Atochem	31
Wellman	24
Nylon Corp.	22
BASF	20
Custom Resins	20
Emser	10

Source: Society of the Plastics Industry

CELLOPHANE

ALONE IN A PLASTIC CROWD

New technology and salesmanship may be able to keep this unique film competitive

There is some news to report about this decades-old packaging film. Innovations in manufacturing technology and marketing strategy hold promise of keeping cellophane viable.

One innovation is the recent technological advance in cellophane manufacture that is now reducing the cost of cellophane fibre—not film—made

overseas. If used to make film, the new process could bring the cost of this packaging material down near that of PP. Yet the consensus among suppliers of cellophane and plastic films appear to be that, even if the price drops significantly, the market for cellophane will remain flat.

Dedicated users

More than a few packagers are dedicated users of cellophane. They prefer this film's feel, gloss, clarity, rigidity, printability, and machinability. More important, they own machinery that cannot accommodate any film that melts.

Some of the trends that are benefiting plastic packaging films today may be helping non-plastic cellophane. One of them is the phenomenal growth of snack foods.

Cellophane still has a place in this market, being an ingredient in laminated

wrappers. Pop-at-home popcorn also is a positive influence on cellophane, which is a good barrier to oils and which does not melt.

In addition, a philosophical factor may be working in cellophane's favor. Growing interest in the clean disposal of municipal waste could give cellophane a marketing leg up on its plastic film competitors, for the non-plastic film is the only transparent film that is biodegradable.

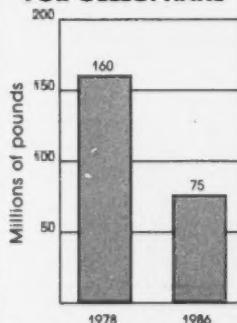
Ironically, in order to make their film more widely applicable than before, cellophane suppliers have made it less biodegradable. Packagers of snacks, candy, cookies, and cheese are expressing interest in reinforced cellophane and the brand-new metallized reinforced cellophane. These laminates owe their improved packaging capabilities in great part to layers of PET, PP, and plastic adhesives.

Metallized cellophane—actually, metallized PET sandwiched between layers of cellophane and polymer coatings—is a prime candidate for candy, dried foods, snacks, nuts, and coffee.

The benefits of superb barriers offered by cellophane laminates of these types do not come cheap. Cellophane coated with either PVDC or nitrocellulose currently sells for approximately \$2.00 a pound. Metallized cellophane runs roughly \$2.70.

Cellophane remains in use as a monolayer for candy and in laminations for cheese.

U.S. DEMAND FOR CELLOPHANE



Source: Society of the Plastics Industry

1987 CELLOPHANE CAPACITY MILLION LBS.

Flexel (USA)	90
Cydsa (Mex.)	22
BCL (Can.)	20

Source: Industry estimates



CO-EXTRUSIONS

MORE RELIABLE,

Better adhesives, by allowing better film composites, are enlarging the role of flexibles

Many resin manufacturers agree that much of the innovation in flexible-films packaging today occurs at the level of the film co-extruder.

After several years of intense research and development, a balance has been achieved between highly specialized resins, sophisticated co-extrusion equipment, and savvy marketing techniques.

Not long ago, users of traditional films who tried co-extrusions soon wished they had not. Quickly, many companies in the co-extrusion business stopped referring to their films as co-extrusions and created their own brand names for them. This strategy worked well over the years for the makers of branded films and their nonbranded competitors alike as overall quality rose.

Tight lips

This is a business of secrets—that is, proprietary information. In most cases, there is little dialogue between the companies that produce the plastic resins and the companies that combine those resins into specialized films. “We know what they’re buying but we don’t have a clue as to how they’re using it,” said one resin supplier.

The raw materials utilized in developing a sophisticated co-extruded film may come from several different resin suppliers. These resins are

MORE COMPLEX

combined in ways that few co-extruders care to discuss with anyone in detail. However, most of them will say that they would not be able to work their magic without help from better adhesive, or tie, resins.

Co-extrusion resins used with the correct tie layers allow the mixing of apples and oranges. Diverse film resins can be teamed up to create a single film that is more than the sum of its parts.

This business of co-extrusion tie-coat adhesives is a thriving one. A recent estimate pegs its annual growth at an average 33 per cent. And sales of co-extrusion adhesives are expected to increase from \$7 million to almost \$30 million over the next decade.

Improvements in ties

Several leading resin manufacturers have been working on significantly improved tie layer resins, and with great success. One company has developed a high-barrier PVDC adhesive which combines good bonding strength, good water vapor transmission rates, and good oxygen barrier. Another has developed LLDPE resins for use in tying LLDPE to nylon layers for boil-in-bags, plus PP-based resins which tie EVOH or nylon layers to PP for retortable food packages.

Manufacturers of products that once were packaged in something as basic as glassine are moving quickly to co-extrusions. And in their effort to continually add value to the films they make, co-extruders are working on increasingly complicated structures.

For example, a film structure can begin with a barrier material that does not readily adhere to the desired plastic film resins. The barrier must therefore be co-extruded with an adhesive resin on either

side. On one side of this three-layer co-extrusion could be a layer of polypropylene; on the other, polyethylene.

Some converters and film extruders are making films that have five, seven, and even 11 layers.

Who needs 11 layers?

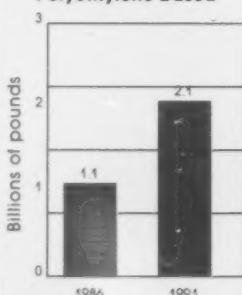
What kind of product needs an 11-layer film? Foods such as snacks and dairy products may, because they are subject to multiple damaging forces. Even the simplest-looking snacks package is in reality complex. There may be a layer of white PE because white is best for printing. Co-extruded with this layer might be a layer of brown PE to keep sunlight out, EVOH as an oxygen barrier, and then a layer for low-temperature sealing.

The process is expensive, but several factors enable makers of co-extruded films to keep costs down.

Co-extrusion can minimize the use of expensive resins by reducing their layer thicknesses to as little as three microns. Furthermore, sophisticated co-extrusions can incorporate one or more commodity resins—PE or PP—as a structural layer. Co-extrusion enables converters to start with resin instead of film, which eliminates production steps by extruding all the resins at once.

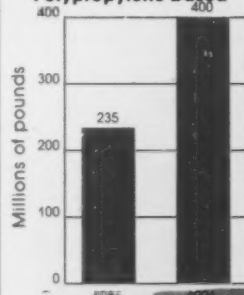
The co-extrusion process produces scrap. Before advanced tie-layer materials were developed, such scrap was utterly useless. Now tie layers can be used to mask both sides of a scrap layer. ■

GROWTH OF CO-EX PACKAGING FILMS
Polyethylene-based



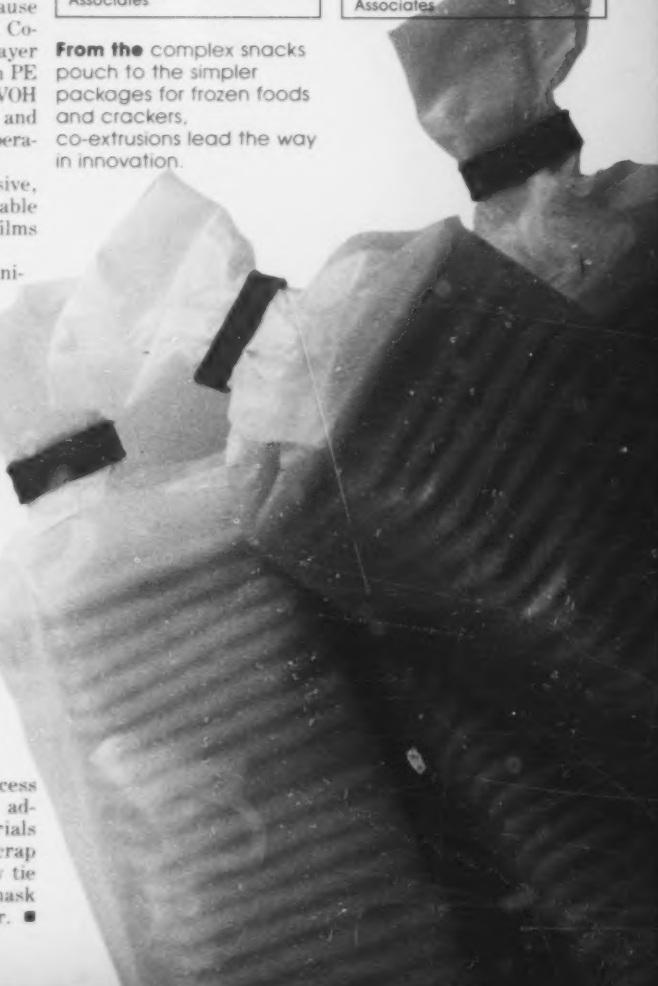
Source: Phillip Townsend Associates

GROWTH OF CO-EX PACKAGING FILMS
Polypropylene-based



Source: Phillip Townsend Associates

From the complex snacks pouch to the simpler packages for frozen foods and crackers, co-extrusions lead the way in innovation.



LAMINATIONS

DOING WHAT CO-EX CAN'T

Demand grows for film with foil, paper, plastics, and printing

Just as paper was the flexible packaging material of choice before there was plastic film, lamination was an effective method of combining various substrates before there was co-extrusion.

Now, though, if you talk only with manufacturers of

multilayer co-extruded films, you might come away with the idea that coatings and laminations are becoming processes of the past.

This attitude appears sound . . . as far as it goes. Lamination is a multi-step procedure. Each layer, measured in mils, must be sufficiently thick to be handled—to be adhered to the next one. When making co-extruded films, a one-step process, some of the layers can be measured in microns.

And so, the question is, Why would anyone choose to build a film package one layer at a time when the less time-consuming and materials-consuming process of co-extrusion is readily available?

One answer: No one has yet found a way to blow plastic film bubbles with paper, aluminum foil, cellophane, or printed film inside. That means laminations—of plastics to film, plastics to paper, and plastics to foil—will be creating highly versatile,

attractive packages for a long time to come.

One such lamination, according to the sole worldwide manufacturer of acrylonitrile copolymer, is more than merely a cost-effective package—it could very well be “the ultimate container.” Made of a lamination of acrylonitrile copolymer film to polyethylene and then a lamination of this to paperboard, such a container would provide unparalleled barrier and structural characteristics.

Do-everything adhesive

A leading manufacturer of plastic resins for packaging recently introduced a unique polyester-based adhesive which might go that so-called ultimate container one better. The copolyester is now being commercially extrusion-

Film with paper, film with foil, and film with both are just three of many laminated pouches in wide use.



coated on paperboard. Eventually, it may be used as a coating for foil and polyester film. This resin simultaneously serves as a heat-seal layer, an aroma and oxygen barrier equal to polyester film, and a food-contact surface. Copolyester will undoubtedly prove valuable where more traditional sealing materials such as LDPE present organoleptic problems.

When the goal is a flexible package, plastic films alone are sometimes not sufficient. Reinforced cellophane, for example, is a lamination of plastic and non-plastic films which together provide a look, a feel, and combined barriers that co-extrusions cannot duplicate.

Although glassine is being replaced by plastic film in many applications, considerable amount of glassine is still in use—as inner wrappers for graham crackers, for instance. And much of that glassine is a laminated product: PP on the outside and perhaps PE on the inside.

Other paper is being combined with film in laminations and with film resins in extrusion coating to satisfy a varied group of end users. One converter who specializes in paper pouches touts his com-

pany's advances in making paper barrier bags. The company applies four separate coatings of PVDC to paper before laminating this paper to heat-sealable plastic film. Multiple, thin layers remain flexible and help assure that pinholes in the EVOH coats do not line up.

Whenever locked-in printing is the goal—whether the substrates are plastic or non-plastic—lamination is the only process available. In some cases inks must be kept away from the product to avoid migration of solvents. In others, the inks are buried chiefly to prevent scuffing.

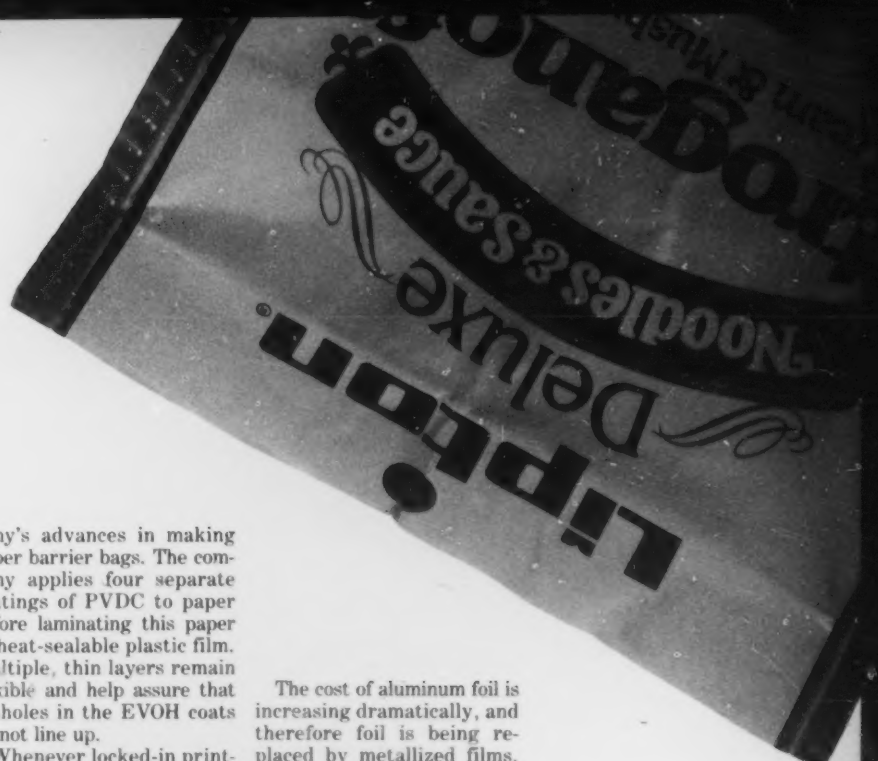
One potentially hot new use for printed plastic film laminates is in-store wrapping of such products as microwaveable foods. The result is a package that provides the needed barrier as well as a combined "deli" look and store-branded look. Very likely, this would be a five-layer co-extruded film laminated to printed film.

The cost of aluminum foil is increasing dramatically, and therefore foil is being replaced by metallized films. However, aluminum foil is still a crucial component of many flexible packages. And these are laminates.

A big pouch for foodservice ketchup can be made of three layers: oriented nylon, foil, and perhaps oriented PET film.

A similar laminated pouch is expected to be used in the packaging of detergent for single-use applications. These could be laminations of PET, foil, and LLDPE.

Co-extrusions are partners in the continued viability of the lamination business. In stepping up from a monolayer film as a means of extending shelf life, packagers can consider coating that film with a barrier resin such as PVDC. Another step up would be a lamination of that coated film to metallized PE or PP. Next would be a multilayer co-extruded film laminated to the previous lamination, perhaps with a middle layer of EVOH or nylon. ■



METALLIZING

PERFORMANCE AND

Good looks and barriers are crucial to snacks and candy, and metal provides them

No matter who is doing the talking at the time—resin maker, film manufacturer, or converter—whenever the subject of snacks arises, mouths start to water. What has these packaging professionals licking their chops is the stimulating growth rate of the snack foods industry and the sales opportunities it represents. Converters, at the forefront of innovation, are buying heavily into metallizing technology.

When it comes time to discuss particular examples, on the tip of everybody's tongue is the name of one single brand of snacks, for it created

a packaging style that other brands have been clamoring to follow. That trendsetter quickly rose to prominence in the marketplace by establishing for itself a high-tech, high-end, high-quality image through flashy graphics... and metallized plastic film.

Metallized film once was used primarily for esthetics: the look of foil without the expense. Then interest in this metallic look faded. But recently, metallized film is back, and looking better than ever.

Looks, though, are not everything. If they were, metallized films would probably be in hotter competition than they are with the combination of expanded-core OPP film and transparent inks, which can approximate the appearance of metallics.

More than just looks

The material that has made snacks packaging so glisteningly attractive to the eye has also helped keep them satisfying to the palate. Metallized films provide excellent barriers to, as one converter put it, "all the things that can turn potato chips into soap." This factor proves especially significant when regional snacks

distributors go nationwide.

Not long ago, only foil could have provided the needed barrier to ultraviolet light and oxygen. Crazing, flex cracking, and microporosity were major problems for metallized films. The cracks and holes were minute, but from the standpoint of oxygen permeation, they might as well have been the size of portholes. At roughly the point in time that the price of foil began to reach prohibitive heights, advances in metallizing improved the opacity of plastic film.

Expanding market

In competition with chips and nuts, popcorn has recently enjoyed great success as a microwave-ovenable snack, and part of that success must be credited to metallized PET film, which is particularly well-suited to microwave use as a result of its high melting point. The popcorn packages contain a layer of metallized PET between layers of paper. In this use, known as a microwave receptor or susceptor, the metallized film in effect focuses microwave energy, thereby helping reduce the number of unpopped kernels.

Susceptor technology has also found its way into other microwavable foods including frozen fish, pizza, and waffles. This has been working so well to heat and brown these and



PIAZZ

other products that manufacturers of metallized PET foresee a time when several levels of susceptor "focusing" will be incorporated into a single microwavable foods package, providing varying degrees of heating and browning.

Metallized polyester can be laminated to cellophane to boost the paper-based film's barriers significantly in such applications as snacks and nuts and is replacing foil and paper for products such as granola bars. Metallized PET is also in wide use for fractional pack pouches of coffee.

Demand for metallized PET is greatly exceeding supply. At this time a year ago, one manufacturer said, sales hit 1.2 million pounds. Now the figure is near 4 million and could easily go to 6 million if the required additional manufacturing capacity were on-stream.

PET is not alone

It used to be that polyester was the only kind of film that could be metallized with optimal results. Recently, other types of plastic films are being successfully metallized.

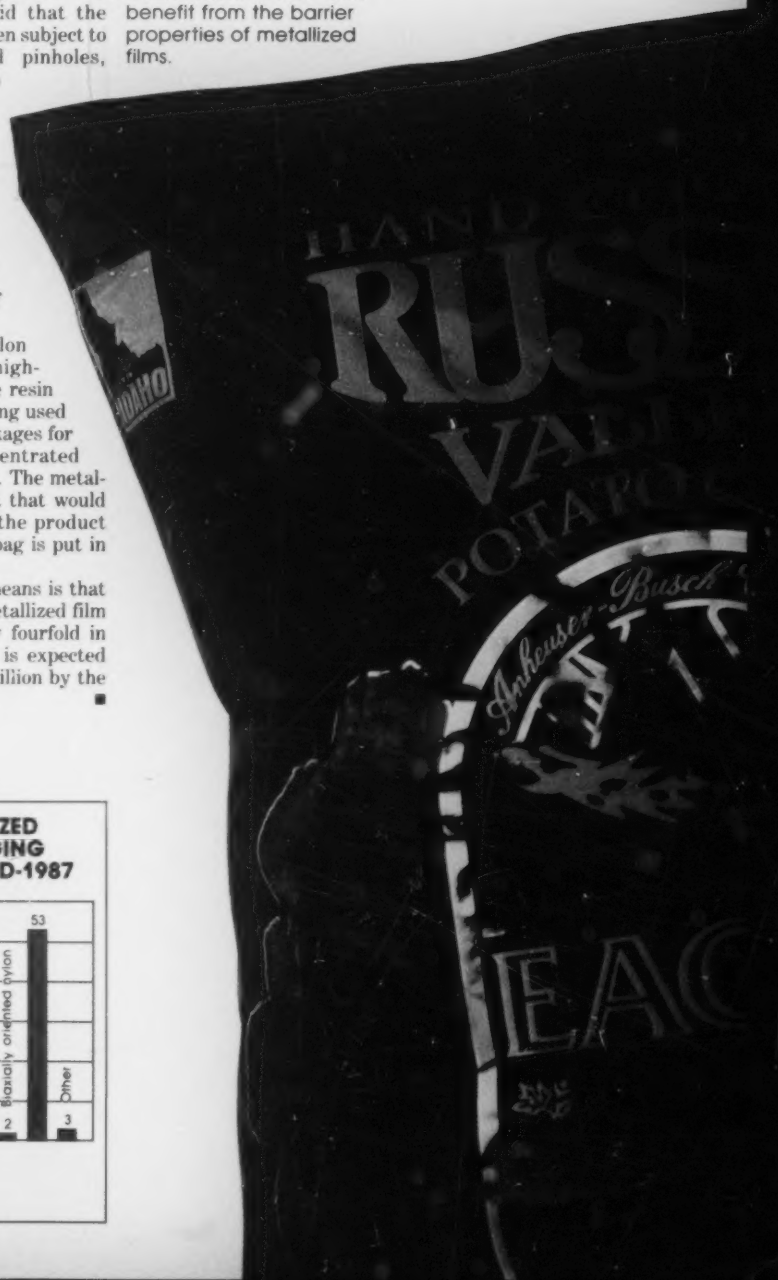
Converters are also metallizing oriented polypropylene, with excellent results. One candy manufacturer recently

replaced aluminum foil with reverse-printed BOPP film laminated to metallized white opaque BOPP film for its entire line of candy bars. The manufacturer said that the foil, which had been subject to flex cracks and pinholes, allowed the bars to dry out and become stale too quickly. In addition, the creases and cracks in the foil gave the packages a man-handled sort of appearance.

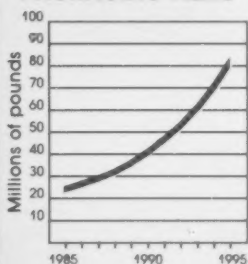
Metallized nylon laminated to high-EVA polyethylene resin as a sealant is being used in bag-in-box packages for wine and concentrated soft-drink syrups. The metallizing blocks light that would otherwise harm the product before the filled bag is put in the box.

What all this means is that the market for metallized film has grown nearly fourfold in recent years and is expected to reach \$80-90 million by the end of the 1980s. ■

Confections and snacks benefit from the barrier properties of metallized films.

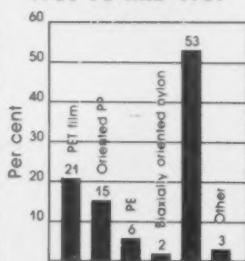


U.S. GROWTH OF METALLIZED PACKAGING FILMS



Source: Association of Industrial Metallizers, Coaters and Laminators

METALLIZED PACKAGING 1986 TO MID-1987



Source: AIMCAL

BARRIER FILMS

SATISFYING INCREASED DEMANDS

Professional
smellers and
tasters spur
continued
barrier R&D

Start with a film like cellophane, an inherently good flavor barrier. Laminate it to polyester, which stops oxygen. Metallize the PET to get an excellent barrier to ultraviolet light. In some applications, this combination of barriers would be sufficient. In others, it might not be enough. Take, for example, these:

Pouches of liniment and toothpaste. Easter egg kits containing potentially fruit-scented dyes. Peppermint gum packed in boxes of breakfast cereal.

End-user interest in barriers is growing dramatically. Perhaps the most striking symbol of this fact is the continuing investment by resin manufacturers in panels of organoleptics tasters and smellers. These groups investigate instances of changes in food products caused by plastic packaging.

To limit these undesirable effects, the following barrier materials are growing in popularity.

Ethylene vinyl alcohol

New investment by American companies in EVOH technology is raising domestic production of this barrier

resin for use as a product-contact layer in flexible plastic packaging for such products as processed meats.

Since EVOH can be co-extruded with nylon as well as with polyolefins, another application is in bags and pouches for liquid food products.

The price of the resin is high, but EVOH is usually co-extruded with or laminated to less expensive resins, which lower the total cost of the package while protecting the barrier from moisture.

New EVOH materials are on the way. One of them maintains its high barrier at high humidity. A probable application is meats packaging—especially refrigerated meats. Another new EVOH is said to be less affected than present types by the relatively high co-extrusion temperatures of other plastic resins.

Polyvinylidene chloride

PVDC film—especially a new high-barrier variety, is also an excellent barrier to gases, water vapor, odors, aromas, and flavors. PVDC resin is also sold as a coating for other plastic films and as a resin for co-extrusions.

Among applications of PVDC film is the product-contact layer in gable-top folding cartons for orange juice. Monolayer PVDC film is also presently in wide use as in-store wrap for cheeses, meats, and other deli items.

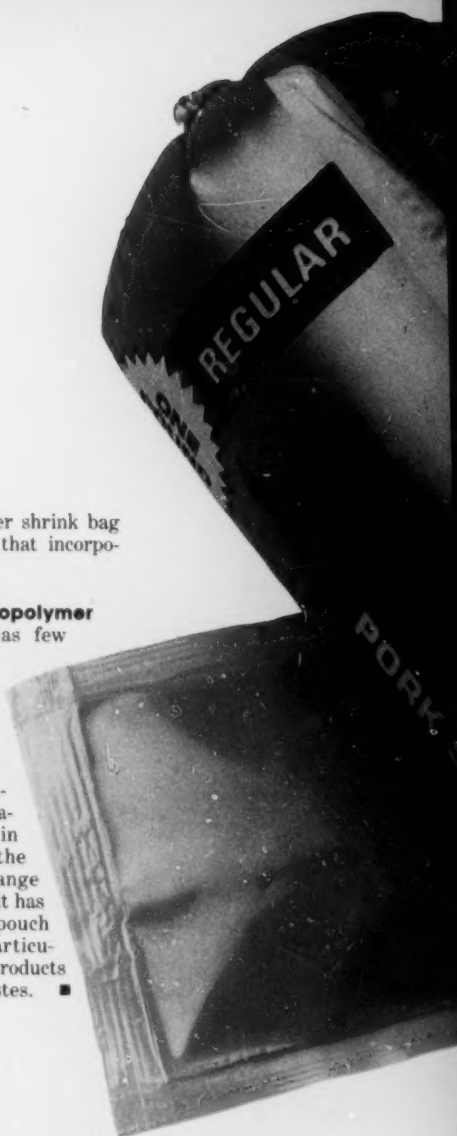
A high-barrier variety of PVDC film is also used in medical applications such as bags of intravenous solutions. And at least one converter is

making a barrier shrink bag for fresh meat that incorporates PVDC.

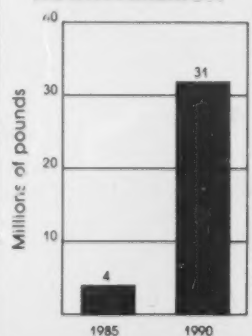
Acrylonitrile copolymer

This resin has few

flexible-packaging applications at present. Its nonscalping barrier properties make it valuable as an alternative to PET in packages like the composite orange juice can. Also, it has been used in pouch packages of particularly aromatic products such as toothpastes. ■



**EVOH MARKET
DEMAND
NORTH AMERICA**



Source: Industry estimates

Protecting flavors and aromas are barrier resins in film packages of sausage and banana puree.

PACKAGING

THE CAHNSERS MAGAZINE FOR DECISION MAKERS JANUARY 1988

Packaging Efficiency Soars 60% at Gillette

1988

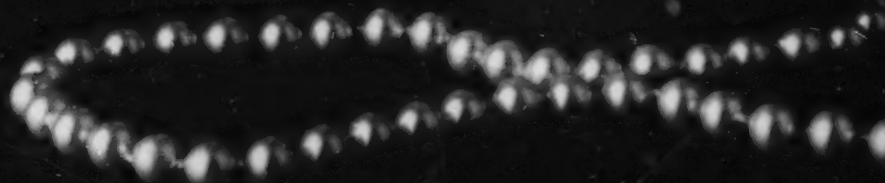
Outlook

Oxygen Absorbers
Preserve Food

Hardy Packages
Sell Snacks

Inspection
Made Easy

Here Comes a
New Polyethylene



CONTENTS

THE STAFF

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VOLUME 33 NUMBER 1

PACKAGING NEWS

- Oxygen absorbers keep food fresher** 8
Iron-oxide packets maintain product freshness through oxygen absorption in controlled-atmosphere packaging
- Self-chilling sake can** debuts in Japan 12
- New Wave graphics** promote Maybelline mascara 13
- Custom can hails** Log Cabin's 100th anniversary 14
- Tamper-evident PET jar** bows for Plochman's mustard 14
- Statistics: Food labels** rate "fair" in accuracy 37

PACKAGING FEATURES

SPECIAL REPORT

- Container prices, shipments up sharply in 1988** 42
Suppliers to raise prices in response to stronger exports and the weaker dollar

PACKAGING OPERATIONS

- Plant of the Month: Gillette: Efficiency up, rejects down** 50
When Gillette convinced line crews of its commitment to improvement, their response triggered the gains

MARKETING

- Flashy packages reflect new consumer tastes** 58
As the market flourishes, snack-makers innovate to protect the flavor and crunch

STATE OF THE ART

- On-line inspection offers simpler choices** 68
Software systems make inroads in packaging, but some tasks move faster with simple sensing

PACKAGING TECHNOLOGY

- New package for microwave ovens** 75
A low-density, foamable blend provides substantial heat performance over traditional polystyrene
- Stronger, tougher polyethylene** 79
New family of ultra low-density polyethylene has greater resistance to punctures and tears
- Thermal-transfer printer** turns out UPC codes at 120 per minute 92
- Strobe lights** check print accuracy at 2,000 feet per minute 93
- Combination net weigher** pays for itself in less than a year 94
- Carton-forming speed** doubles with instant hot-melt adhesive 99
- Matrix kit helps** select the right box—at the right price 100

DEPARTMENTS

EDITORIAL	3	NEW EQUIPMENT	86	ADVERTISERS INDEX	108
PEOPLE	16	NEW MATERIALS	95	WRAP UP	108
ASSOCIATION NEWS	30	CLASSIFIED	101	READER SERVICE CARD	109

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PACKAGING NEWS

STATISTICS

LABEL PHOTOS RATED 'FAIR' IN ACCURACY

Few consumers called food pictures "poor"

Consumers responding to a recent PACKAGING magazine survey reported that they believed photographs on food product labels to be generally accurate.

Asked to judge label photos in terms of accurate representation of the products inside the packages, 42.7 per cent of the respondents gave them a "fair" rating and 30.0 per cent called them "good."

Label accuracy received an "excellent" rating from 12.9 per cent of the respondents; almost as high a percentage of them rated the photographic representations "poor."

The survey, conducted by PACKAGING and NFO Research, obtained 721 responses out of a total 1,000 consumer households contacted.

ROLE OF PLASTIC SEEN GROWING STEADILY

Shift from other materials is the key

A new study released by the Society of the Plastics Industry, Washington, D.C., reported an annual growth rate of nearly 4 per cent for plastic packaging materials between now and the year 2000.

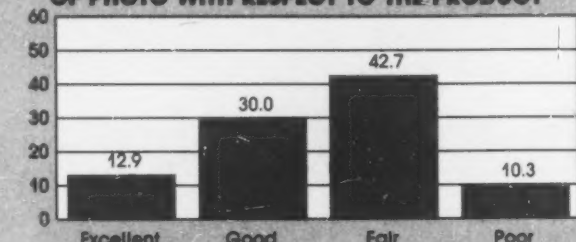
The study said this will happen despite low population growth, which could be expected to limit the market for packaging materials in general. A drive toward ever-greater convenience and the resulting replacement of traditional packaging materials with plastics will offset the demographic factors.

Not all plastics will share equally in the growing market. The percentages of polyester (PET), polypropylene (PP), and high-density polyethylene (HDPE) will increase according to the study, but those of polyvinyl chloride (PVC) and low-density and linear low-density polyethylenes (LDPE and LLDPE) will drop.

By the turn of the century, said the SPI, plastics will account for over 40 per cent of food packaging materials in the United States—up from 20 per cent in 1985.

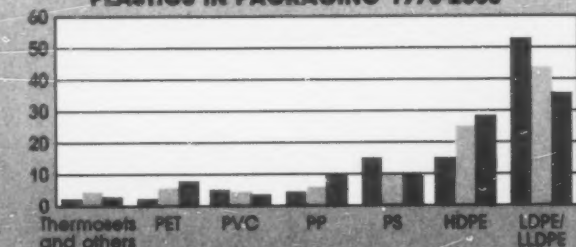
For more information about the SPI study, write to the Society of the Plastics Industry, 1275 K. St. NW, Suite 400, Washington, D.C. 20005.

RATING OF FOOD LABELS IN ACCURACY OF PHOTO WITH RESPECT TO THE PRODUCT



Source: PACKAGING's 1987 Consumer Survey

PLASTICS IN PACKAGING 1970-2000



Source: The Society of the Plastics Industry

PACKAGING LEADTIMES (in weeks)

	Nov. '87	Oct. '87	Nov. '86
Metal cans	2.5	2.6	2.9
Composite cans	2.6	2.9	3.3
Glass containers	3.6	4.6	5.0
Plastic bottles	2.7	4.1	3.7
Plastic film	3.2	4.2	3.6
Laminates	3.8	5.6	4.3
Corrugated containers	2.7	2.8	2.8
Mail/wall bags	3.8	3.4	3.4
Kraft paper	3.0	2.8	3.2
Folding cartons	3.9	4.0	3.9
Fiber drums	2.8	2.7	2.9
Industrial crates	2.6	2.7	2.9
Strapping	2.5	2.6	2.6
Steel drums (shipping)	2.6	2.5	2.7
Pallets	2.8	2.8	2.8

Source: Purchasing, a Cahners Publication

TRANSACTION PRICES (\$/lb.)

	Nov. '87	Oct. '87	Nov. '86
Aluminum can stock (\$/lb.)	1.08	1.08	1.08
LDPE/liner (\$/lb.)	.40	.38	.27
LDPE/clarity (\$/lb.)	.41	.39	.31
LDPE/butene (\$/lb.)	.38	.39	.27
LDPE/octene (\$/lb.)	.48	.49	.34
HDPE/blow molding (\$/lb.)	.41	.41	.32
HDPE/film grade (\$/lb.)	.42	.42	.35
Polystyrene/general purpose (\$/lb.)	.54	.54	.34
Polystyrene/impact (\$/lb.)	.58	.58	.35
PVC/general purpose (\$/lb.)	.40	.40	.30
PP/homopolymer (\$/lb.)	.55	.46	.35
PP/copolymer (\$/lb.)	.55	.55	.46
ABS (\$/lb.)	1.07	1.57	.98
Unbleached kraft/shipping sack (\$/ton)	480	480	430
Unbleached kraft/grocery sack (\$/ton)	430	430	375
Linerboard, 42 lb., east (\$/ton)	380	380	320
Linerboard, 42 lb., west (\$/ton)	380	380	320
Corrugated med. semichemical (\$/ton)	350	350	300
Recycled folding boxboard, clay coated (\$/ton)	410	410	390
Recycled folding boxboard, chipbd. (\$/ton)	320	330	300
Bleached kraft, folding carton (\$/ton)	625	625	610

Source: Purchasing, a Cahners publication

MAKERS OF PACKAGING MACHINES ADOPT CAD

Computers help keep companies competitive

Packaging machinery manufacturers in the United States are increasingly adopting computer-aided design (CAD) systems to help them improve designs and raise productivity, according to a survey by the Packaging Machinery Manufacturers Institute, Washington, D.C.

The survey revealed that 46 per cent of PMMI's member companies now use CAD systems and 72 per cent of those companies not presently using CAD systems intend to acquire them within the next two years.

Primary uses of the systems are in making drawings and layouts of mechanical, electrical, and electronic equipment.

CORRUGATED GROUP REPORTS JUMP IN SALES

Converters also see rise in shipments

Independent corrugated converters reported an average increase in dollar sales of more than 17 per cent for the first half of 1987 compared with last year, according to the Association of Independent Corrugated Converters, Alexandria, Va.

During the same period, said the AICC, the companies responding to the survey reported an average 11.7 per cent increase in square footage shipped.

Of the association's 500 box-making members, 168 responded to the survey.

For more information about the AICC's Quarterly Business Conditions Survey, write the AICC at 801 N. Fairfax St., Alexandria, Va. 22314.

MORE STATS . . .

According to Cahners Economics, Newton, Mass., **consumer spending for alcohol** purchased with meals and beverages hit a seasonally adjusted level of \$24.2 billion in the first half of 1987. That represents a real increase of 2.8 per cent over the same period of 1986 . . . Of all readers of PACKAGING who responded to the magazine's 1987 Salary Survey, 66 per cent agreed with the following statement: "Problems concerning the **recyclability of plastics** will adversely affect the plastic container's competitive future." The full 1987 Salary Survey is contained in the Nov. issue.



CONTAINER PRICES, SHIPMENTS UP SHARPLY IN 1988

Surging exports and a weaker dollar have allowed container suppliers to raise prices. Shipments of paperboard and plastic containers will also increase this year—metal and glass are harder to call

By Melissa Larson
Senior Editor

The good economic news for buyers of packaging is over in 1988—suppliers of materials and finished containers are raising prices in response to stronger exports, a weaker dollar, and production running at or near capacity in many facilities.

Shipments will be up sharply for paperboard and plastic containers in 1988. Metal can shipments will depend upon the rise in raw material prices, and how much of these increases can makers will be able to absorb.

Glass shipments will finish flat in 1987 and resume a gentle downward trend in 1988—apparently the only exception to the general upward trend. Glass container prices may be up only 1 or 2 per cent in 1988, depending in part on pending merger activity among glass container giants.

These are the predictions of several private economic forecasting firms, including Cahners Economics, which have been carefully tracking packaging materials and finished containers. They also reflect the views of Wall Street analysts and other industry observers. Although views vary on just how much prices and shipments will increase, there is not much doubt that the trends are up.

Recent stock market volatility, changes in the value of the dollar against foreign currencies, and export levels for packaging could all play a role in determining how closely 1988 container prices and shipments conform to these predictions.

Producer price index

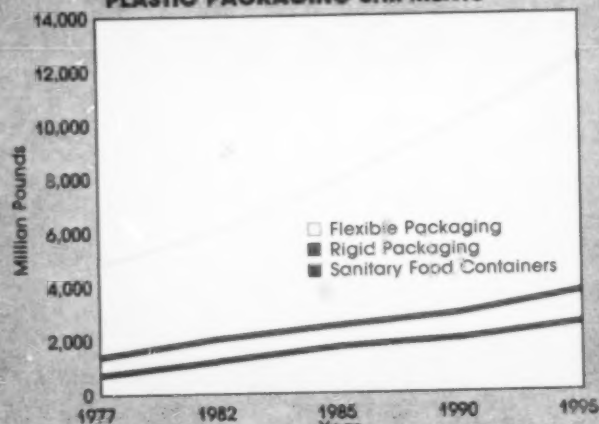
Price information received from Wharton Econometrics Forecasting Associates, and presented here in chart format, is based on the Producer Price Index for selected packaging materials.

Kept by the U.S. Bureau of Statistics, the Producer Price Indexes "measure average changes in prices received in primary markets of the U.S. by producers of commodities in all stages of processing," according to the Bureau.

Data for 1984 through the

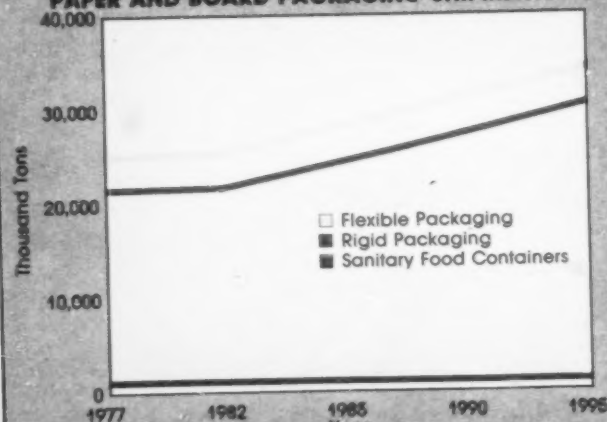


PLASTIC PACKAGING SHIPMENTS



Source: The Freedonia Group, Inc., Cleveland, Ohio

PAPER AND BOARD PACKAGING SHIPMENTS



Source: The Freedonia Group, Inc., Cleveland, Ohio

METAL CAN SHIPMENTS 1982-1986 (million cans)

	1982	1983	1984	1985	% Change 1986 '85-'86	
Total Metal Cans Shipped	89,321R	92,394	97,781	101,899R	104,913	+3.0
By Market						
For Sale	89,375R	61,907	66,405	69,810	75,509	+8.2
Beverage	42,726	45,167	48,719	52,017	57,266	+10.1
Food	13,048R	12,914	13,739	13,974	14,227	+1.8
General Packaging	3,601	3,826	3,947	3,819	4,017	+5.2
For Own Use	29,946	30,487	31,376	32,089R	29,404	-8.4
Beverage	15,208	16,289	16,925	18,160	15,637	-13.9
Food	14,579	14,027	14,374	13,870R	13,761	-1.2
General Packaging	159	171	77	89	66	+11.9
By Product						
Beverage	57,934	61,466	65,644	70,177	72,902	+3.9
Beer	31,729	33,135	34,354	35,614	36,056	+1.2
Soft drinks	26,205	28,321	31,290	34,563	36,844	+6.6
Food	27,627R	26,941	28,113	27,844R	27,928	+0.3
Baby Foods	895	902	915	936	956	+2.1
Coffee	653	632	644	615	553	-10.1
Dairy Products	889	927	974	1,246	1,203	-3.5
Fruit, Fruit Juices	3,788	3,651	3,389	3,046R	2,783	-8.6
Meat & Poultry	1,411	1,492	1,508	1,492R	1,447	-3.0
Pet Foods	3,593	3,571	4,020	4,069	4,468	+10.3
Seafoods	1,341R	1,527	1,657	1,881	1,914	+1.8
Shortening	246	247	186	109	65	-49.5
Vegetables, Veg. Juices	9,087	8,303	8,702	8,339R	8,544	+2.5
Other Foods, Including Soup	5,734	5,689	6,168	6,111	5,985	-2.1
General Packaging	3,760	3,997	4,024	3,878	4,083	+5.3
Aerosol	1,970	2,144	2,223	2,277	2,530	+11.1
Paint & Varnish	795	817	840	830	816	-1.7
Automotive Products	257	229	199	166	133	-20.8
Other Nonfoods	738	807	762	603	604	+0.2
By Material Used						
Steel	36,393R	34,316	34,654	34,559R	34,302	-0.7
Aluminum	52,928	58,078	63,127	67,340	70,611	+4.9
Weight Of Aluminum Cans Shipped						
(Thousands of lbs.)	2,809,951	3,168,123	3,562,327	3,560,704	3,730,291	+4.8
R = Revision						

Producer price indexes are up for most packaging commodities

present are featured, with Wharton's forecast for the remainder of 1987 and 1988. The index line on the chart tracks the price movement of the commodity from the base level of 100, which represents the average price level for the "base" year indicated.

The indexes are valuable because they consistently measure price movements, are tracked by the U.S. government, based on actual transaction prices wherever possible, and are corrected for inflation. They're also significant because many long-term purchase contracts for these commodities are keyed to the Producer Price Index, according to Frantz Price, director of strategic industry analysis for Wharton Economics.

Also of interest to purchasers of packaging materials is the following actual transaction forecast price data from Cahners Economics. The service's predictions include a forecast of 43 cents per pound for LDPE liner by the 4th quarter of 1988, up sharply over 38 cents per pound for the 4th quarter of 1987.

Aluminum can stock will hit \$1.15 per pound by the end of 1988, according to Cahners. Another prediction is that kraft linerboard prices, which soared in 1987, will remain as high as \$385 per ton in 1988.

"Prices are rising, basically, because there is rising demand in all four packaging categories," stated Price, in explaining Wharton's basis for its 1987-1988 predictions.

"There is a surge in exports, tied to the lower value of the dollar against foreign currency, which means that packaging producers are less dependent on domestic sales. They may also be trying to recoup past losses."

Glass containers

Price commented that operating rates will improve for glass container manufacturers as excess capacity is cut—a trend which may continue into 1988.

In fact, there was an uptick in glass container shipments for 1986, reflecting new popularity for glass food containers and a perceived "bottoming out" of the drop in demand for glass beer bottles—the bellweather of glass container usage.

HOW TO READ THESE CHARTS

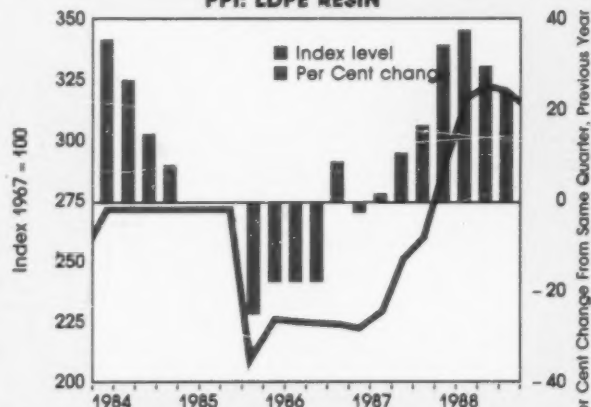
These commodity price tables, using the U.S. government's Producer Price Index, should be read in the following way: the curving line represents the index itself, and corresponds to the index numbers on the left side of the table. The "index year" is the base line in terms of price for that particular commodity. For example, the index year for corrugated shipping containers (chart below) is 1967—which represents a base level of 100. Between 1967 and 1984, the first year of the chart, the PPI rose from 100 to 250. Remember that the PPI tracks price movements, not actual dollars and cents. The series of bars refers to the percentages listed on the right side of the table, and represent the per cent increase or decrease in the PPI from the same quarter of the previous year. There are four quarters shown per year, or four bars. A five-year price trend for each commodity is presented, with the 4th quarter of 1987 and all of 1988 representing Wharton's forecasts.

GLASS SHIPMENTS (Thousands of Gross)

Type of Container	1986	1985	1984	1983	1982
Narrow Neck					
Food	27,737 ^P	23,770	26,170	28,270	27,658
Medicinal and health supplies		8,710	10,140	9,665	12,393
Chemical, household, and industrial	15,907 ^P	942	1,379	976	1,456
Toiletries and cosmetics		5,302	6,566	6,506	8,006
Beverage, refillable		1,553	2,100	3,383	3,729
Beverage, nonrefillable	52,093	58,532	59,475	59,234	57,291
Beer, refillable		1,870	3,473	2,475	1,899
Beer, nonrefillable	87,601	81,907	87,323	94,625	105,962
Liquor	10,873	11,939	14,015	14,712	13,757
Wine	17,157	14,036	10,414	8,916	8,408
TOTAL NARROW NECK	224,368	208,561	221,055	228,762	240,559
Wide Mouth					
Food	60,044	59,935	64,302	60,108	63,372
Medicinal and health		2,715	3,150	2,995	3,097
Chemical, household, and industrial	4,830 ^P	1,015	988	812	1,159
Toiletries and cosmetics		595	455	426	659
TOTAL WIDE MOUTH	64,874	64,260	68,895	64,341	68,287
TOTAL (NARROW & WIDE MOUTH)	289,242	272,821	289,950	293,103	308,846

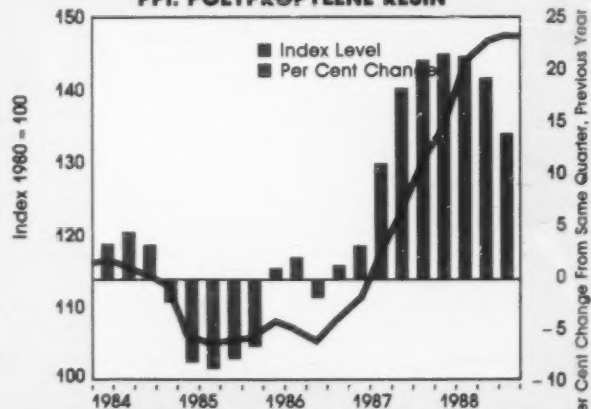
Source: U.S. Dept. of Commerce ^P = PACKAGING Estimates

PPI: LDPE RESIN



Source: The WEFA Group (Wharton Econometric Forecasting Associates), Bala Cynwyd, Pa.

PPI: POLYPROPYLENE RESIN



Source: The WEFA Group (Wharton Econometric Forecasting Associates), Bala Cynwyd, Pa.

The Glass Packaging Institute reports a 1.6 per cent increase in glass container shipments through the first three quarters of 1987. However, other observers feel that 1986 was an aberration, that 1987 will wind up flat, and that glass shipments are likely to decline slightly in 1988.

Glass container price forecasts are in the 3-4 per cent range, although some Wall Street analysts have scaled back to a 1-2 per cent increase. They say the Owens-Illinois/Brockway deal, and its effect on glass manufacturing costs, may have an impact on glass price increases.

Metal cans

It's no secret that aluminum prices have been up

sharply, but thus far aluminum can manufacturers have largely avoided passing along these increases to finished containers. The year 1988 will probably see an increase, however—estimates range from 4 to 7 per cent.

Steel can prices are headed up also, according to Wharton's data. Shipments for metal cans in general will depend on continued inroads into beverage packaging, and on new food container applications for both steel and aluminum.

Paper and board

Paperboard packaging capacity will soon be straining 99 per cent if the dollar continues to fall. Competition between plastic and paperboard packaging has resulted in in-

creased growth for both types of packaging. Surging pulp prices are also having an effect.

Prices for linerboard, corrugated containers, and even coated paper label stock will be up in 1988, according to Wharton Econometrics, while Cahners Economics advises observers to watch order lead times closely.

Plastic containers

Full-out production, and its effect on resin prices, is the story here. Virtually every major packaging resin will experience healthy price increases in 1988, and the reason is simple, according to Wharton's Price. "Plastics are operating at full capacity," he stated.

Meanwhile, a recent study

by the Freedonia Group, Cleveland, Ohio estimates that plastics demand will grow 5 per cent annually through 1990. In the same report, the group predicts rising shipment rates for virtually all flexible and rigid plastic packaging. ■

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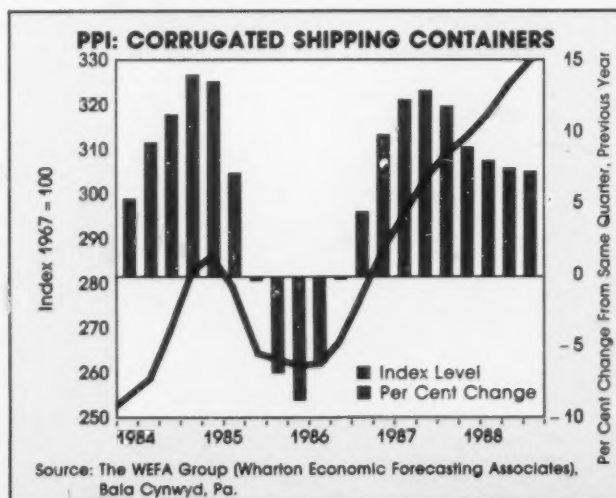
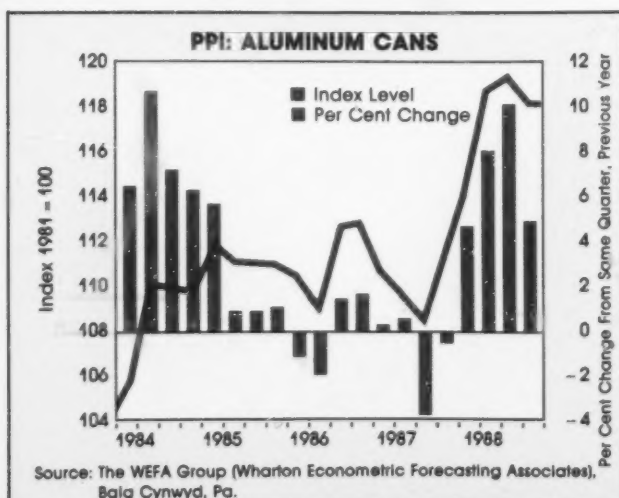
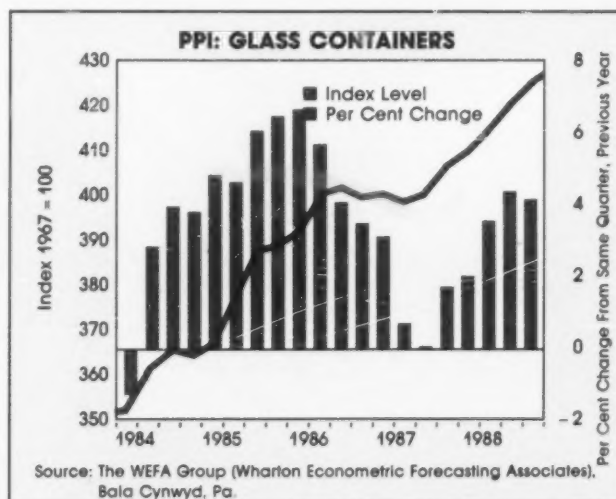
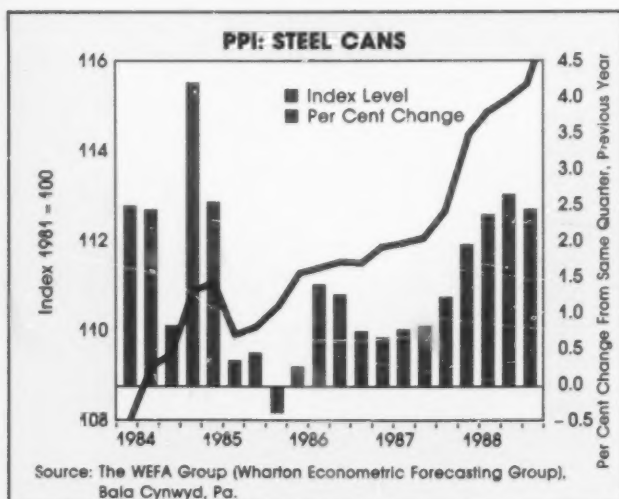
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MELISSA LARSON

Senior Editor

"The price jumps headed our way appear to be based in solid economic realities—a falling dollar vs. foreign currencies, making U.S. packaging commodities more attractive abroad, and leading to tighter supplies for these goods here at home."



NOTE

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PACKAGING

THE CAHNER'S MAGAZINE FOR DECISION MAKERS/FEBRUARY 1988

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